CLAIMS

1. An integrated sensor device for measuring a distance between the sensor device and an object, the sensor device comprising:

a first capacitor plate positioned adjacent the object to form a first capacitance between the first capacitor and the object;

a second capacitor plate positioned adjacent the object to form a second capacitance between the second plate and the object, the second plate being coplanar with the first plate; and

an amplifier having an input and an output, the input being connected to a voltage source and the first plate and the output being connected to the second plate to form a negative feedback branch that includes the first and second capacitances, whereby an output voltage is established at the amplifier output that is proportional to a distance between the first plate and the object

2. The sensor device of claim 1, further comprising a layer of insulating material contacting outer surfaces of the first and second plate, such that the insulating material is positioned between the plates and the object.

3. The sensor device of claim 1, further comprising:

a logic unit connected to the input of the amplifier, the logic unit being structured to generate an electric charge variation; and

an output detector connected to the output of the amplifier, the output detector being structured to detect a voltage step at the amplifier output that is based on the electric charge variation and the first and second capacitances.

4. The sensor device of claim 3 wherein the logic unit includes a reference voltage source for generating a voltage step and a capacitive element interposed

between the voltage source and the amplifier input, the capacitive element producing the electric charge variation in response to the voltage step.

5. The sensor device of claim 1 wherein the first and second capacitor plate and amplifier comprise a first cell of an array of substantially identical cells integrated on a single semiconductor chip.

23. A sensor device for measuring a distance between the sensor device and an object, the sensor device comprising:

a voltage source providing an input voltage;

a first capacitor plate positioned adjacent the object to form a first capacitance between the first plate and the object;

a second capacitor plate positioned adjacent the object to form a second capacitance between the second plate and the object; and

an amplifier having an input and an output, the input being connected to the voltage source and the first plate and the output being connected to the second plate to form a negative feedback branch that includes the first and second capacitances.

24. The sensor device of claim 23 wherein the amplifier includes an inverting amplifier.

25. The sensor device of claim 23 wherein the first and second plate and the amplifier comprise a sensor cell in an array of sensor cells positioned adjacent the object such that each sensor cell measures a distance between the sensor cell and the object.

26. The sensor device of claim 23, further comprising an input capacitor connected between the voltage source and the amplifier input, wherein the distance between the first plate and the object is inversely proportional to an input capacitance developed on the input capacitor.

27. The sensor device of claim 23, further comprising a dielectric layer positioned between each of the first and second plates and the object, wherein the first capacitance is inversely proportional to the distance between the plates and the object.

28. The sensor device of claim 23, further comprising a switch connected between the amplifier input and output such that when the switch is closed the amplifier input has a voltage equal to a voltage on the amplifier output and when the switch is opened the amplifier output has the output voltage that is proportional to the distance between the plates and the object.

29. The sensor device of claim 23 wherein the object is a finger having a ridge adjacent a valley, the first and second plates and the amplifier comprising a first sensor cell that measures a distance between the ridge and the plates, the sensor device further comprising a second sensor cell positioned adjacent the valley to measure a distance between the valley and the second sensor cell and thereby determine a border between the ridge and the valley.

30. The sensor device of claim 23 wherein the sensor device is integrated on a single semiconductor substrate.